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**Covariance Matrices for Nuclear Cross Sections
Derived from Nuclear Model Calculations ^a**

by

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Abstract

The growing need for covariance information to accompany the evaluated cross section data libraries utilized in contemporary nuclear applications is spurring the development of new methods to provide this information. Many of the current general purpose libraries of evaluated nuclear data used in applications are derived either almost entirely from nuclear model calculations or from nuclear model calculations benchmarked by available experimental data. Consequently, a consistent method for generating covariance information under these circumstances is required. This report discusses a new approach to producing covariance matrices for cross sections calculated using nuclear models. The present method involves establishing uncertainty information for the underlying parameters of nuclear models used in the calculations and then propagating these uncertainties through to the derived cross sections and related nuclear quantities by means of a Monte Carlo technique rather than the more conventional matrix error propagation approach used in some alternative methods. The formalism to be used in such analyses is discussed in this report along with various issues and caveats that need to be considered in order to proceed with a practical implementation of the methodology.

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